DOCUMENT RESUME

ED 193 784 EA 013 021

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TITLE International Equivalence in Student Performance: Implications from the IEA for International Schools.
PUB DATE Jul 80
NOTE 44p.

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Academic Achievement; Achievement Tests; Analysis of Variance; *Comparative Education; *Comparative Testing; Elementary Secondary Education; Foreign Students; *International Education; Regression (Statistics); *Student Evaluation; Tables (Data); Verbal Ability
IDENTIFIERS International Assn Evaluation Educ Achievement; *International Schools

ABSTRACT

International Schools are organized in countries throughout the world to serve students whose parents are employed away from their home country. The purpose of this study was to identify generalizations in research about the equivalence of academic performance on an international basis. The study considered research conducted by the International Association for the Evaluation of Educational Achievement (IEA) that involved testing students in reading comprehension, literature, science, mathematics, civic education, French as a foreign language, and English as a foreign language. National research centers were organized to conduct the studies in each country in the sample and over 300 experts, 240,000 students and their teachers, and 9,700 schools were involved in the project. Common denominators affecting the achievement of students from various countries appear to be the student's verbal ability, the effect of home and community background, the amount of time spent studying a subject, and strong attitudes supportive of education. (Author/MLF)

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INTERNATIONAL EQUIVALENCE IN STUDENT PERFORMANCE: IMPLICATIONS FROM THE IEA FOR INTERNATIONAL SCHOOLS

by

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July, 1980

EA 013 021

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Background and Purpose

International Schools are organized in countries throughout the world to serve students whose parents are employed by governments, businesses, international organizations, and religious institutions. Students attending these schools generally intend to enter universities after completing the secondary level of schooling. A series of anomalies develops as one considers the education required by the student at the pre-university level:

1. Students reside in any one country abroad for less than five years and generally do not plan to become established in the country of residence indefinitely. As a result, students are not educated in the national systems where they reside.
2. Students may have been educated almost entirely abroad and can encounter difficulty reintegrating into the educational systems of their own countries.
3. Schools preparing students for university admission must plan programs appropriate for entrance into universities in virtually any country in the world.
4. In most countries, examinations are taken at the end of secondary school to determine qualification for university admission. Students educated abroad, however, must demonstrate the equivalence of their secondary program with that of students educated in a national system. (Renaud, 1974)

International Schools, then serve a transient population from a variety of educational backgrounds who may potentially seek admission to most any university system in the world.

The diversity of programs offered by national systems cannot be reasonably duplicated by International Schools. Schools can, however, develop knowledge and skills which are common to many national programs. The purpose of the study was to identify generalizations in research about the equivalence of academic performance on an international basis. Administrators and curriculum planners in International Schools can apply the generalizations to account for common denominators between students in school programs.

IEA Achievement Studies

The study considered research conducted by the International Association for the Evaluation of Educational Achievement (IEA) which involved testing students in reading comprehension, literature, science, mathematics, civic education, French as a foreign language, and English as a foreign language. The purpose for the IEA project was to identify factors which account for differences between countries, schools, and students, through a cross-sectional survey at three levels. The project did not attempt to discover the best educational systems, but was interested in generalizations which could be made on an international basis. Both cognitive and affective outcomes were included in the testing process.

Each study took nearly seven years to complete and three to four years were spent in the design of the test instruments. National research centers were organized to conduct the studies in each country in the sample. The process of development, testing, and analysis involved national and international committees which identified subject matter content and objectives, constructed and criticized test items and questionnaires, directed pilot studies and sampling procedures, translated test material from its original language, performed item analyses, collected data, and analyzed the results. Over 300 experts, 250,000 students and their teachers, and 9700 schools were involved in the project. (Council of Europe, 1973)

The subject matter content of the tests was compiled from analyses of major textbooks, syllabi, national examinations, and comments from groups of teachers. Test items were designed to reflect various abilities, complete coverage of subject matter, and equal representation of information from countries contributing to the test design. The IEA intended that the instruments represent an international concensus about knowledge and educational aims. Information about students and their home backgrounds, teachers, schools, and programs was collected through questionnaires. Over 150,000,000 items of information were gathered in the project. The number of variables for each subject ranged from 300 to 500. (Bloom, 1975; Bloom, 1974; Postlethwaite, 1974; Postlewaite, 1975). Although twenty-two countries representing fifteen

languages were included in the project, the IEA planners believed it was possible to measure achievement reliably and develop a basis for meaningful comparisons. (Postlethwaite, 1975)

The groups of students tested were defined according to the following categories:

Population I: All students aged 10:0 to 10:11 years at the time of the study.

Population II: All students aged 14:0 to 14:11 years at the time of testing.

Population III: A category to be used by each country according to its own definition, using Population II tests.

Population IV: All students who were in the terminal year of full-time secondary education programs which were either pre-university programs or ones of the same length.

Population IVS: All students in Population IV who were regarded in their own systems as specializing in the subject being tested. (Postlethwaite, 1974)

Different categories were used for testing in mathematics which occurred earlier than testing in other subject areas. Populations 1a and 1b were defined as all 13 year old students and the grade group with the largest number of 13 year old students. Populations 3a and 3b included students specializing or not specializing in mathematics in the terminal year of secondary education. (Husen, 1967). Data from Populations IV and IVS and Populations 3a and 3b in mathematics is reflected in the generalizations with which this study is concerned.

Student scores were used as dependent variables and input and process factors were independent variables in regression analyses. Variables were combined into blocks in order to simplify the accounting for variance among students and between schools. (Postlethwaite, 1974; Postlethwaite, 1975).

Blocks used to cluster factors were:

Block 1: Home and student variables including father's education and occupation, number of books in the home, use of a dictionary, size of family, sex, and age.

Block 2: Type of school and program.

Block 3: Conditions of learning, including school policies and teacher characteristics.

Block 4: Kindred variables including attitude toward education and expected occupation.

Block 5: Test of Word Knowledge used as a surrogate for previous schooling and home variables in criterion scaling for type of school or type of program.

Block 6: Test of Reading Comprehension used as a surrogate in a manner similar to Block 5.

A model of causation was developed which related input variables by blocks to achievement in each subject, assuming that earlier events influenced later ones. Variables in Blocks 1 and 2 were seen as possible determiners of variables in Blocks 3 and 4. Block 2 factors were believed to reflect home circumstances, student abilities, and the student experiences also described in Block 1. Block 3 variables were influenced by the effects of Blocks 1 and 2 including the school's community, student characteristics, and the program. Block 4 variables measured factors available at the time of testing but possibly influenced by variables occurring earlier in the regression. (Postlethwaite, 1974; Postlethwaite, 1975).

A specific sequence of steps was involved in the reduction of variables. In order to make comparisons between schools, variables which indicated father's occupation, type of school and type of program were scaled using Blocks 5 and 6 as criteria. A home background composite was developed consisting of weighted factors for father's occupation, mother's education, father's education, number of books in the home, use of a dictionary in the home, and size of family. The weights used were regression weights obtained when reading comprehension was regressed on each variable in the composite. Finally, a school

handicap was developed based on weighted variables of home background and describing in context the efficiency of the program, allowing for characteristics of students received by the school. The variables used in the final testing process were ones related to subject matter achievement in all countries or in at least one or more countries. (Postlethwaite 1974).

The mathematics test included subscores for higher and lower mental processes, verbal and symbolic formulation, new mathematics, computation, advanced arithmetic, algebra, geometry, analytical geometry, analysis, and sets. (Husen 1974). Objectives measured in science involved functional knowledge comprehension of scientific principles, application of knowledge for problem solving, and higher mental processes. Science areas tested were earth science, physics, chemistry, biology, and practical science. (Postlethwaite 1975)

The reading comprehension test included comprehension, word knowledge and speed, while the literature test measured comprehension, interpretation, and attitudes toward reading. English as a Foreign Language and French as a Foreign Language both were given only to students who had studied the language for two years and included subscores in reading, listening, writing, speaking, interest in learning the language, expected utility of the learning, and out of school activities that involved use of the language. Civic Education included a total cognitive score and subscores for citizenship, institutions, processes, ability to use simple or complex behaviors, knowledge about society, and attitudes toward Civic Education. (Postlethwaite 1975).

Generalizations

International Schools assume their student populations include many high achievers who would be ranked in the upper levels of performance in their own countries, although empirical studies of this assumption are lacking. International Schools, however, have as one of their main goals the preparation of students to enter universities throughout the world and programs are designed accordingly. Curricula in International Schools is assumed to be appropriate for students at the upper levels of performance whether or not the students enrolled in such schools are actually at those levels. For the purpose of this study, the assumption will be accepted that International School programs are appropriate if designed for students at higher levels of performance and that many students in such schools are actually at those levels.

Two kinds of generalizations about achievement were made by authors of the IEA reports. One kind was drawn from information regarding the significance of blocks of variables. The second kind of generalization was based on data indicating the effect of individual variables which were important in each study.

Generalizations from Blocks of Variables

T. Neville Postlethwaite, Executive Director of the IEA, observed that Block 1 variables accounted for little of the total variance in achievement. The highest amount of variance explained was in science (13%) and civic education (10%). Block 2 variables accounted for less variance than that explained by Block 1. Block 3 variables accounted for 19% of the variance in French as a Foreign Language, 17% in English as a Foreign Language, and 15% in science. While more variance was explained by Block 3, the amount accounted for was still low. (Postlewaite, 1975). The total variance reported by Postlethwaite was highest for English as a Foreign Language (44%), French as a Foreign Language (43%), science (39%), and civic education (39%). (Postlethwaite, 1974)

Comber and Keeves, authors of the science report, presented the explained variance in between-student and between-school analyses. The total variance accounted for between students was highest in

Scotland (63%), the Netherlands (63%), England (61%), Finland (56%), New Zealand (54%), Sweden (52%), and France (49%). In the between-student analysis, learning conditions contributed most of the total variance. (Comber and Keeves, 1973).

Comber and Keeves, however, found more variance accounted for in a between-school analysis. Block 1 variables explained a total of 44% of achievement in all countries with the highest variance accounted for in England (66%), Chile (64%), the Netherlands (63%), Hungary (59%), and Scotland (51%). Block 2 variables accounted for the most variance in France (48%), while Block 3 variables explained 45% of the variance in achievement in India. In the between-school comparison made by Comber and Keeves, almost twice as much variance was explained by Block 1 as by Blocks 2 and 3 combined. (Comber and Keeves, 1973)

Generalizations from Specific Variables

The interpretation of achievement according to the variance explained by blocks does not contribute to explicit generalizations regarding performance on an international level. The amount of unexplained variance was too great to allow general inferences to be drawn between countries. Analysis of individual variables, however, was more productive of generalizations about international equivalence. The following generalizations seemed to be supported by the IEA data and are most relevant to international education.

1. Students at the 95th percentile are roughly equal in achievement in all subjects.
2. Non-school factors account for a significant amount of the variance in achievement.
3. A students command of verbal skills determines much of what will be learned.
4. The amount of time spent studying a subject effects the student's performance in that subject.
5. Attitudes supportive of school and further education accompany successful achievement.
6. The subjects studied by students are equivalent in between-school comparisons although the relative emphasis placed on various parts of the content is different.

Students at the 95th percentile are roughly equal in achievement in all subjects

Bloom (1975) concluded from the IEA data that the top 5% of students in the world are roughly equal in achievement both at age 14 and the final year of secondary education. He noted that the observation held for the top 5% of the age group even though countries showed different retentivity rates for the age group still in school. According to Torsten Husen, Chairman of the IEA in 1967, the top 4% of students in the final year of pre-university education were comparable in mathematics achievement. Between country differences, shown in Table 1, were small even in the United States which had a higher rate of retentivity for the age group than any other country in the sample. (75% for the United States and 9% for the Federal Republic of Germany). Husen found the means of the upper 4% of students specializing in mathematics in each country to be less variable than the means of students scoring lower. Comparing means of the upper 3% of the age group for students not specializing in mathematics, Husen again found a reduced variability in six of the eight countries tested, as Table 2 demonstrates. (Husen 1974; Comber and Keeves 1973). Husen also concluded that different percentages of students in individual countries reach the 95th percentile. Table 3 indicates the highest percentages of the total age group of students specializing in mathematics who entered the 95th percentile were found in Belgium (21%), England (12%), Japan (10%), and France (9%). Table 4 represents the percentage of the age group of students not specializing in mathematics who reached the 95th percentile.

Table 1. Means and standard deviations of Mathematics scores for total sample and equivalent proportions of the age group in each country at the terminal Mathematics level.

	All Terminal Mathematics Students		Selected Terminal Mathematics Students in Upper 4% of Age Group	
Country	M	S.D.	M	S.D.
Australia	21.6	10.5	33.7	6.6
Belgium	34.6	12.6	34.6	12.6
England	35.2	12.6	39.4	9.8
Finland	25.3	9.6	32.1	6.5
France	33.4	10.8	37.0	8.0
Germany	28.8	9.8	31.5	7.8
Israel	36.4	8.6	41.7	4.4
Japan	31.4	14.8	43.9	7.7
Netherlands	31.9	8.1	34.7	6.2
Scotland	25.5	10.4	29.4	9.8
Sweden	27.3	11.9	43.7	6.2
United States	13.8	12.6	33.0	8.9
Range	22.6		14.5	

(Table 3.37 in Husen, 1967, p. 122)

Table 2. Means and standard deviations of Mathematics scores of total sample and equivalent proportions of the age group in each country at the terminal non-mathematics level.

	All Terminal Non-Mathematics Students		Selected Terminal Non-Mathematics Students in Upper 3% of Age Group	
Country	M	S.D.	M	S.D.
Belgium	24.2	9.5	34.9	4.9
England	21.4	10.0	30.2	6.0
Finland	22.5	8.3	29.9	5.6
Germany	27.7	7.6	34.2	4.0
Scotland	20.7	9.5	32.7	4.1
Sweden	12.6	6.2	21.8	3.8
United States	8.3	9.1	30.7	3.6
Range	19.4		13.1	

(Table 3.38 in Husen, 1967, p. 125)

Table 3. Percentage of total age group and preuniversity mathematics students reaching the 95th percentile.

Country	Percent of Age Group	Percent of Mathematics Students
Australia	.15	1.1
Belgium	.84	21.0
England	.60	12.0
France	.45	9.0
Germany	.09	2.0
Finland	.08	1.2
Japan	.80	10.0
Netherlands	.06	1.3
Scotland	.19	3.7
Sweden	.50	3.1
United States	.65	3.6
Range	.78	19.9

(Husen 1967, pp. 129, 131)

Table 4. Percentage of total age group and preuniversity non-mathematics students reaching the 95th percentile.

Country	Percent of Age Group	Percent of Non-Mathematics Students
Belgium	.18	2
England	.14	2
Finland	.07	1
Germany	.06	1
Japan	5.90	12
Scotland	.13	1
Sweden	.00	0
United States	.52	1
Range	5.90	12

(Husen 1967, p.133)

The highest percentage was found in Japan (12%). Students in other countries were more equally represented in the upper 5%. Husen also observed that the achievement of the upper group in developing countries was similar, regardless of the greater socio-economic differences and the greater influence such differences have on achievement. (Husen, 1975)

DeLandsheere, Grisay, and Henry (1974) discussed the performance of high achievers in Reading Comprehension and compensated for different levels of retentivity so that percentages of high achievers could be compared across countries. The number of high achievers in reading was found to be similar in two groups of countries. The first group and their percentages of high achievers included the United States (5.7%), England (5.2%), Scotland (4.8%), French Belgium (4.1%), and Sweden (3.6%). The second group of countries included Flemish Belgium (1.6%), Finland (1.6%), Israel (1.6%), the Netherlands (1.1%), Hungary (1.1%), and Italy (0.4%). DeLandsheere, Grisay, and Henry assumed that selective school systems were efficient enough to retain high achievers and then computed the percentage of high achievers in the whole age group by multiplying the observed percentage of high achievers in the sample by the retentivity ratio in the country whose scores were being scaled. In Reading Comprehension, high achievement was defined as a score of 40 or more. Literature tests were the same in Populations II and IV and the authors concluded that performance increases from age 14 to age 18 were greater for students in countries with high rates of retentivity than for countries with selective systems, as shown in Table 5.

In science, Comber and Keeves reported that the top 5% of students had similar scores and students in countries with selective systems averaged lower than students in countries with higher rates of retentivity. (Comber and Keeves, 1973; Council of Europe, 1973). Means of the top 9% in all countries ranged from 29.9 to 39.9. The average means of the top 5% ranged from 33.3 to 43.5, as shown in Table 6. The percentage of students in all countries in the 90th and 95th percentiles in science is given in Table 7.

Table 5. Increase in achievement from Population II to Population IV in selective and retentive systems.

Type of School	Percentage of High Achievers II	IV
Selective		
Finland	6.8	5.8
New Zealand	12.5	6.7
Italy	2.8	2.3
England	7.9	9.8
Retentive		
United States	9.7	19.9
Sweden	5.6	12.4
Belgium (French)	3.4	7.6
Belgium (Flemish)	1.3	3.6

(DeLandsheere, Grisay, and Henry, 1974 p. 190)

Table 6. Range of science mean scores for high achievers.

	Range of Science Mean Scores
Full Sample	8.3 to 14.2
Top 1%	33.3 to 43.5
Top 5%	33.3 to 43.5
Top 9%	29.9 to 39.9

(Comber and Keeves 1973, p. 174)

Table 7. Students reaching given international standards as percentages of (a) students still at school and (b) the whole age group in Population IV.

Country	International Percentiles 90th	95th
(a) Students as a Percentage of Those Still at School		
Australia	16	8
Belgium (Flemish)	1	1
Belgium (French)	0	0
England	16	9
Germany	16	6
Finland	7	3
France	2	1
Hungary	8	4
Italy	3	1
Netherlands	16	7
New Zealand	33	21
Scotland	17	9
Sweden	7	3
United States	2	1
Range	33	21
(b) Students as a Percentage of the Whole Age Group		
Australia	5	2
Belgium (Flemish)	1	0
Belgium (French)	0	0
England	3	2
Germany	1	1
Finland	1	1
France	1	0
Hungary	2	1
Italy	0	0
Netherlands	2	1
New Zealand	4	3
Scotland	3	2
Sweden	3	2
United States	2	1
Range	5	3

(Table 7.8 in Comber and Keeves 1973, p. 180)

The range of scores for students in the 90th and 95th percentiles varied less than the range for students at lower levels. Comber and Keeves identified three groups of countries with common patterns of achievement in the upper 5% including the four developed Commonwealth

countries, Northern Europe and the United States, and the Romance language countries. Comber and Keeves suggested that common educational traditions may have influenced the performance of the better students. (Comber and Keeves 1973). They also found that differences in the achievement of top students were related to differences among nations, so that a system with a larger proportion of an age group enrolled was not characterized by lower achievement among the top students. (Postlethwaite 1975). A low variance in means for the upper 5% was also found in Civic Education, as shown in Table 8.

Table 8. Means for Civic Education test scores for total sample and for top 5% of the age group in each country in Population IV.

Country by Full Sample Mean Rank Score	% of Age Group in Population IV	N	Corrected Score Means for Full Sample	Score Means of Top 5% of Age Group
New Zealand	13	1665	28.4	31.28
Germany	9	1163	28.2	28.20
Sweden	45	1252	27.0	35.48
Finland	21	2315	25.1	31.38
Netherlands	13	1296	25.5	28.96
United States	75	3016	21.4	35.23
Ireland	38	786	16.9	28.50

(Table 5.5 in Torney, Oppenheim, and Farnen 1975, p. 109)

The generalization that students at the 95th percentile are roughly equal in achievement in all subjects is supported by the IEA data. Little variation existed between mean scores of the upper 5% of students in each country. This relationship appeared to be consistent regardless of the type of school in which students were enrolled. It may be assumed that International Schools enroll many students at higher levels of performance. It may then be concluded that programs of International Schools are appropriate if they enroll students in the upper level of achievement and programs are directed to that level.

Non-school factors account for a significant amount of the variation in achievement.

Bloom (1974) attributed the success of the upper 5% to their parent's high level of education, interest in learning in school and support for the development of verbal ability and reading skills. Parents also held expectation for entry into higher education and professions. Bloom found that students at the upper level of performance had well-developed verbal skills, studied subjects for a maximum number of years, and maintained favorable interests and attitudes for subjects and schooling. The learning level of the upper 5%, in Bloom's opinion, was attributed mainly to non-school factors. Bloom argued that curriculum and instruction in the student's home was related in many ways to curriculum and instruction in school. (Bloom 1975; Bloom 1974). Postlethwaite also found that the father's occupation (professional or managerial) accounted for 20 to 55% of the variance in performance in measures of science, reading comprehension, and literature. (Postlethwaite 1975).

Husen also attributed most of the comparability of high achievers in all countries to the student's home background (Husen 1975). He correlated the level of performance of 13 year old students with the level shown by students specializing in mathematics at the terminal year and discovered increases of performance ranging from 1.83 in the United States to 3.08 for England and 3.16 for France as demonstrated in Table 9. He then correlated the increase in performance with two factors related to selectivity, father's education and occupation. As shown in Table 10, the variables correlated significantly. Rank correlations for the two indices are .54 for father's education and .62 with occupation, resulting in a maximum prediction of .68. (Husen 1967). As described previously, father's education and occupation are variables represented in Block 1 (home background).

Additional analyses by Husen of the effect of home background related the retentivity rate of educational systems with home background for Populations 3a and 3b. Rank correlations between the two variables were described as high by Husen and indicated that students in the terminal year of secondary education were most likely from

higher status levels in Germany, England, Belgium and Finland. The more comprehensive systems retained higher percentages of students from all social classes, (Husen 1967). Husen concluded that the middle class was represented in the terminal year of education more than any other classes, although the bias varied from country to country and did not exist for the United States.

Table 9. Estimate of Increase in Mathematics Performance from 13-Year-Olds to Terminal Mathematics Students.

	Level of Performance for 13-Year-Olds[a]	Level of Performance Terminal Math Students[a]	Increase in Level
Australia	-1.52	0.86	2.38
Belgium	-1.22	1.66	2.88
England	-1.47	1.61	3.08
Finland	-1.33	1.28	2.61
France	-1.53	1.63	3.16
Japan	-0.90	1.55	2.45
The Netherlands	-1.33	1.53	2.86
Scotland	-1.53	1.18	2.71
Sweden	-1.64	1.18	2.82
United States	-1.69	0.14	1.83
Grand Total	-1.49	1.11	2.60

[a]Relative to grand mean and standard deviation of terminal non-mathematics students.
(Table 1.5 in Husen 1967, p. 30).

Table 10. Increment in Mathematics Achievement in Relation to Two Indices of Educational Selectivity.

	Math Achievement Increment	Increase In Level of Father's Education	Ratio of Percentage In Higher Occupations
Australia	2.38	0.5	2.1
Belgium	2.88	0.6	1.9
England	3.08	1.3	3.7
Finland	2.61	1.4	2.1
France	3.16	3.6	2.8
Japan	2.45	2.0	2.1
The Netherlands	2.86	2.6	2.6
Scotland	2.71	1.3	3.1
Sweden	2.82	3.1	2.4
United States	1.83	0.4	1.3

(Table 1.6 in Husen 1967, p. 30)

Husen (1974) noted that similar findings were reported by the Plowden Committee whose research showed that two-thirds of the variance in achievement of 11 year old students was attributable to non-school variables. The Plowden Report covered ages 5 through 11 and indicated that one-half the differences in achievement at age 11 were accounted for by social background in general and specifically by the educational ambitions of parents for their children. Husen added, however, that problems in the multivariate procedures used in the Report produced results which were difficult to interpret explicitly.

Comber and Keeves generalized that, in science, growth in learning between age 14 and the last year of secondary school was due to the social and academic selectivity of a country's educational system. They produced rank order correlations between an index of occupation and growth scores of .87 for students from age 10 to the final year of secondary school and .74 for students from age 14 to the final year before the university level. Similar correlations for parent's education were .54 for father's education and .46 for mother's education

Correlations between growth scores and retentivity were negative. (Comber and Keeves 1973). In a regression analysis for science test scores and variables for Population IV, Comber and Keeves discovered that the highest coefficients occured in Blocks 3 and 4, as indicated in Table 11. The regression analysis of between school contribution

Table 11. Correlations between total science test scores and variables in regression analysis.

Rank Ordering of Variables	Mean	Sign of Correlation Coefficient Plus	Minus
Science interests and attitudes	.59	14	0
Science study	.56	14	0
Science homework	.42	15	0
Opportunity to learn	.41	7	0
Expected education and occupation	.37	14	1
Type of program	.37	10	2
Percent of male teachers	.35	12	0

(From Table 8.5 in Comber and Keeves 1973, p. 225)

to total variance by Blocks, however, showed only 31% of the variance explained by Blocks 2, 3, and 4, while 44% of the variance was explained by variables in Block 1, including home background and sex of the student. (Comber and Keeves 1973).

Torney, Oppenheim, and Farnen, in discussing the tests for Civic Education, also identified variables consistent across countries which indicated the importance of non-school factors. Variables consistent in a positive direction were home background, use of a dictionary in the home, type of school or program, hours of pleasure reading, expected education, interest in public affairs television, participation in civic activities, and peer group decisions by voting. (Torney, Oppenheim, and Farnen 1975). The authors also concluded that selectivity accounted for part of the achievement of students. The authors observed that the Federal Republic of Germany and New Zealand ranked first and second and

were also the most selective systems in the terminal year of schooling Sweden, however, ranked third and retained 45% of the age group in Population IV. The Netherlands with a retentivity rate of 13% was selective in Population IV, but ranked fifth. (Torney, Oppenheim, and Farnen 1975). To equalize the effect of selectivity, the authors used the uncorrected mean of the country with the smallest retentivity rate (Germany 9%) and compared that mean to the means of all other countries. A new rank order was produced with Sweden and the United States ranking first and second although both countries had high rates of retentivity. (Torney, Oppenheim, and Farnen 1975).

While the evidence internationally is not specific for the effect of non-school factors, it may be concluded that such factors do have a significant effect on achievement. The degree of the relationship cannot be determined exactly. However, the importance of factors such as home background, social bias, student characteristics, and student attitudes are strong determiners of achievement. International Schools may assume that their student's achievement is effected to a great extent by factors which were operative prior to the student's enrollment.

A student's command of verbal skills determines much of what will be learned in school.

Bloom (1974) found achievement in science and literature to be highly related to reading comprehension although the relationship was weakest at the terminal level of schooling. A similar pattern existed between achievement in a subject and word knowledge. In discussing the finding, Bloom combined reading comprehension and word knowledge into a composite category which he called verbal education and concluded that it accounted for much of the variation in achievement of students in all countries. The phenomena was attributed by Bloom to the predominance of verbally based instruction in schools, particularly in teaching techniques, textbooks and other materials, and evaluation methods. Bloom concluded that a student with well-developed verbal skills learned from school instruction regardless of the quality of teaching involved. (Bloom 1974). The significance of reading comprehension is indicated in Table 12 which represents a sample of

students who took the same tests in literature, science, and reading. Bloom (1976) added that reading comprehension was a major common element in science and literature and a generalized entry behavior which determined much of what students learn. Instruction seemed to focus on learning specific information and not on complex cognitive abilities (Bloom 1974).

Table 12. Median intercorrelations for literature, science, and reading for countries included in the IEA studies.

	Students Final year of Secondary Education
Science vs. reading comprehension	.44
Literature vs. reading comprehension	.55
Science vs. literature	.28
Science vs. literature holding reading comprehension constant	.05

(Table 3-4 in Bloom 1976, p. 50)

According to Bloom, the variables associated with reading comprehension were reading resources in the home, socio-economic status, parent's interest in the child's education, and the encouragement given a child to read. By the final year of secondary school, verbal ability in most countries determined which students would enter universities and only the most able students survived the selection processes. At this level, reading comprehension accounted for less variance in achievement because of the homogeneity of the group except in the United States where selection was not practiced and 75% of students were still in school at age 18. (Bloom 1975, Bloom 1974). Bloom's argument seems to support both the influence of home background and command of verbal skills.

Platt (1975), however, recognized marked cultural patterns of response in literature which became more specific for students in Population IV. After student responses were normed to teacher's preference for responses, schooling was judged to have an effect as

a reflection of the teacher's moral, ethical, and judgemental values. Cultural patterns in responses to literature were also described by Postlethwaite (1975). Students in Chile, England, and New Zealand showed interest in formal aspects of literary works. Students in Belgium, Finland, and the United States performed better on thematic aspects, while students from Italy scored well in historical elements of literature. While verbal skills, in general, seemed to influence achievement, specific abilities may be predetermined by the cultural background of the student.

Torney, Oppenheim, and Farnen (1975) reported that, in Civic Education, one-fifth of the variance at Population I was attributable to verbal ability after they developed zero-order correlations between the Word Knowledge test and achievement. Table 13 identifies the bases for their conclusions. The highest correlation between Word Knowledge and achievement was developed in the United States. The highest correlation between Word Knowledge and reading comprehension was found for the United States as well.

Table 13. Zero-order correlations between word knowledge and achievement in tests of civic education for seven countries.

Country	Word Knowledge and Achievement	Word Knowledge and Reading Comprehension
Germany	.38	-
Finland	.42	.39
Ireland	.57	-
Netherlands	.33	.31
New Zealand	.43	.54
Sweden	.51	.58
United States	.66	.68

(Torney, Oppenheim, and Farnen 1975, p. 104)

The generalization that a student's command of verbal skills determines much of what will be learned seems to be supported by the IEA data. Home background and verbal ability appear to be interrelated and predictive of achievement in all areas included in the IEA testing. The success of students in International Schools, then, may be partly determined by the verbal abilities of the students enrolled.

The amount of time spent studying a subject effects a student's performance in that subject.

The IEA found a significant relationship between the amount of time a student spends on a subject and achievement in that subject. In discussing this finding, Bloom (1974) observed that, in some countries, students spend 90% of their class time actively engaged in learning, while in other countries students spent only about 50% of their time in direct participation. Also, the students in the 95th percentile studied each subject for a maximum number of years.

In foreign language, Postlethwaite identified a significant correlation between national mean scores and the average number of years that French had been studied. (Postlethwaite 1975). Carroll (1975) observed that high achievement in French was dependent on the time at which French instruction began and suggested that French study should start by Grade 6 in order to achieve at a level equal to that of the highest achievers by the last year of secondary school. The average number of years that French was studied in countries participating in the IEA program is given in Table 14. The correlation between the number of years of French study and achievement in French was significant. Carroll reported adjusted correlation coefficients of .869 for speaking fluency and .985 for reading.

Comber and Keeves (1973) also concluded that the amount of time spent studying science was important. The number of hours spent learning science either at the time of the testing or in previous years correlated highly with achievement in science. The correlations reported by Comber and Keeves were .09 in Chile, .14 in Germany, .15 in Finland, .25 in Sweden, .29 in the Netherlands, .34 in Iran, .35 in the United States, .42 in New Zealand, .43 in England, .53 in France, .57 in Scotland, and .76 in India.

However, the authors believed an optimal amount of time for studying science was apparent and determined that, in some countries, a greater amount of time spent on science homework resulted in a lower average level of performance. The total contribution for science was .32 for

Table 14. Average years of French study in eight countries.

Country	Average Years of Study
Chile	4.8
England	7.3
Netherlands	5.7
New Zealand	5.5
Soviet Union	3.7
Scotland	5.4
Sweden	4.3
United States	4.4

(Carroll pp. 164-165)

study and .40 for homework. The correlation between achievement in science and reading comprehension was higher, however, than for the amount of time.

A comparison between countries of the ages at which students entered secondary school, the ages of students in the terminal secondary year, and the correlation for science study and homework revealed that the Netherlands and England retained students in secondary school for the longest period of time and produced the highest correlations (.68 and .62) between the mean of the country and the coefficient for science study and homework. Beyond the first two countries, however, no consistent relationship existed. The data for this inference can be inspected in Table 15. Husen found that the highest scores in mathematics were earned by students aged 18 to 18 1/2 who outperformed students aged 19 to 20. (Husen 1967).

Sandbergen (1974) noted that twelve variables survived the analysis of science scores for the Netherlands. One-half the total variance

Table 15. Comparison between number of years in secondary school and means in science correlated with science study and homework

Country	Number of Years of Secondary Education	Correlation Between Science Study and Homework
Australia	5	.51
Chile	6	.13
England	8	.68
Germany	6-8[a]	.25
Finland	7	.49
France	-	.58
Hungary	3	.19
India	5-7	.31
Italy	7-8	.23
Netherlands	9	.62
New Zealand	4-5	.56
Scotland	5	.60
Sweden	-[b]	.44
United States	6	.38

a Some schools have an observation or guidance period associated with transfer from primary to secondary education.
b The distinction between primary and secondary education does not apply.

(Adapted from Table 4.1 in Comber and Keeves 1973, p. 57)

or 24% was explained by the twelve variables and 21% of the explained variance was attributable to the number of hours of science teaching and the amount of homework in science.

The generalization that the amount of time spent studying a subject effects the student's performance in that subject seems supportable from conclusions drawn by authors of IEA reports. Amount of time was defined in terms of the number of years spent studying a subject, the number of class hours, and the number of hours of homework for the subject. No attempt was made to weight the factors against others or against non-school factors. International Schools need to account for the study of subjects prior to their enrollment. The consistent study of a subject, even though the student may be enrolled in any one school for a short period of time, may be an important determiner of successful achievement.

Attitudes supportive of school and further education accompany successful achievement.

According to Bloom (1974, 1975), students who performed well held positive attitudes about the subject and a significant correlation was found between affective and cognitive outcomes. Husen (1967) added that high achieving students viewed mathematics as fixed, closed, hard to learn, for the intellectually elite, and important to the future of society. Bloom (1975) also reported that attitudes about school and school learning were related to achievement in various subject areas. The number of hours spent reading for pleasure was related to achievement in literature and reading comprehension. Affective attitudes, however, were related more to student's perceptions of their peer standing than to achievement. The top 5% of achievers held the most favorable attitudes about subjects and school. (Bloom 1974)

Husen (1967) observed that important variables in mathematics were years of education expected which correlated .18 with achievement, years of education desired (.14), status level of the desired occupation (.11), expectation for more mathematics (.15), desire to take more mathematics (.18), and interest in mathematics (.30). High achievers, however, tended to be less enthusiastic about school and school learning. Husen also gave between-school and between-student correlations which indicated that attitudes were important in predicting student achievement in mathematics. Table 16 shows that the correlations were highest for attitudes about school and school learning and about the place of mathematics in society. Variables representing attitudes were also significant for interest in mathematics, desire to take additional mathematics, and attitudes about man and his environment. Mathematics experience, interest in mathematics, and educational plans correlated more closely than other variables with achievement. A weak relationship was found between performance and teacher training and other school factors.

Table 16. Correlations of variables with total corrected mathematics scores, Population 3a.

Variables	Within Countries	Between Countries
1. Total school enrollment	a	-.66
2. Percentage male teachers	a	.56
3. Educational differentiation	-	.34
4. Number subjects taken Grade 12	.04	.71
5. Number subjects taken Grade 8	-	.86
6. Per pupil expenses, teacher's salaries	-	a
7. Length of teacher training	-	-.23
8. Recent inservice training	-	-.54
9. Degree of freedom, teacher	-	-.45
10. Opportunity to learn all items	.19	.80
11. Perception of teaching	-	-.51
12. Perception of school as discovery	-	.10
13. Attitude-mathematics as process	-	-.54
14. Attitude-difficulty learning mathematics	-	-.39
15. Attitude-place of mathematics in society	-	.57
16. Attitude-school and school learning	-.06	.65
17. Attitude-man and environment	-	.49
18. Hours of instruction	.13	.18
19. Hours in school week	-	.31
20. Hours of mathematics homework per week	-	.35
21. Hours all homework per week	-	.45
22. Status of father's occupation	-	.51
23. Desire to take additional mathematics	.24	.47
24. Level of mathematics instruction	.28	.49
25. Interest in mathematics	.36	.28
26. Hours devoted to school work per week	-	.39

a Correlations low or variable from country to country

(Table 2.1 in Husen 1967, p. 50)

The generalization that attitudes supportive of school and further education can be inferred from the IEA data. Bloom (1974) found, however, that affective behaviors were developed as a by-product of cognition and stated that interest in science and reading for pleasure were significantly related to science achievement and reading comprehension.

Attitudes may influence achievement or high achievement may result in strong attitudes about school. In either case, attitudes about the importance of the subject, school and school learning, and the future of man in society explain part of the variance in performance in the IEA studies. International Schools may assume that students who project interest in school and further education may be high achievers. Since the source of such attitudes is undetermined, schools may need both to provide students with opportunities to express the attitudes they hold and to develop support for the importance of school-based education. International Schools should not necessarily assume credit for the supportive attitudes of students or insist that students be self-motivated.

<u>The subject studied by students are equivalent in between-country comparisons although the relative emphasis placed on various parts of the content is different</u>.

Students in the upper 5% of achievers in the IEA studies were roughly equal in achievement as shown in the first generalization. It may also be seen that students were exposed to the same subjects, although specific topics and methods of presentation were not the same. Comber and Keeves (1973) found in science that physics was more commonly studied in all countries but no general pattern existed for other science subjects. Studies in England, France, Italy and Sweden who were enrolled in specialized programs may not have studied science at all. Students in Scotland were required to take five subjects, one of which could have been science. In the United States, enrollment in science was often determined by requirements of colleges for entrance. Countries with the highest proportions of students studying science were Australia, Belgium, Chile, the Federal Republic of Germany, Finland, Hungary, New Zealand, and Thailand. Science was required for students in Belgium (Flemish), Chile, the Federal Republic of Germany, and Thailand. Enrollment in science was optional in England, France, India, Italy, Scotland, Sweden, and the United States. Comber and Keeves observed that Continental Europe followed a theoretical tradition in science instruction, while most English-speaking countries used an empirical approach emphasizing laboratory work.

In an analysis of content taught in science subjects, fifty-three areas of concentration were identified. Belgium, Finland, and Japan taught more earth science topics than other countries. Biology topics were equally represented in the programs of all countries except in Iran and Finland which included more topics than the others. Iran and Finland taught fewer topics in chemistry. More topics in physics were taught in Germany and Thailand. Belgium, Chile, Iran, and Thailand taught 43 or less items out of the fifty-three included in the test. (Comber and Keeves 1973)

Standard scores reported by Comber and Keeves indicated fewer differences among developed nations than between the four developing countries included in the sample. The highest score was gained in New Zealand and the lowest in the United States and the developing countries. Ranking the scores of each country indicates the range which was present:

New Zealand	2.40
Germany	2.16
Australia	1.89
Netherlands	1.72
Scotland	1.70
Hungary	1.68
Finland	1.30
Sweden	1.23
France	1.12
Belgium (Flemish)	1.01
Italy	0.83
Belgium (French)	0.77
United States	0.57
Thailand	0.41
Iran	0.16
Chile	-0.01
India	-0.35

The range of scores of the developed nations was 1.83 and the range of all scores was 2.18. The smallest differences were recorded among the following groups of countries - Germany, Australia, the Netherlands, Scotland, and Hungary; Finland, Sweden, and France; Belgium, Italy, and the United States. (Comber and Keeves 1973)

Standardized subtest scores showed that different subjects were emphasized in different countries. Australian students scored highest in chemistry and evenly in the other tests. English students scored highest on practical work. German students performed best in biology, but were also high in physics. Students in New Zealand scored high in all areas, but highest in chemistry and practical work. The highest scores in biology were gained by students in Germany and New Zealand, and the scores ranged from .80 to -.63 in Belgium (Flemish) with a standard deviation of 2.92. The highest scores in chemistry were found in New Zealand, Australia, and the Netherlands with a standard deviation of 3.27. Germany and New Zealand scored highest in physics and a standard deviation of 3.75 was observed. Practical work performance by students from New Zealand resulted in a score of .79 with the next highest score being .42 in England. The standard deviation for practical work was 2.60. (Comber and Keeves 1973)

Comber and Keeves also reported standardized scores for science subtests according to behavioral objectives including teaching for information, understanding, application, and the use of higher mental processes. Only in France did students perform best in higher mental processes. Student responses by behavioral category were best in the following areas:

Information-Germany, Finland, Italy
Understanding-Belgium (Flemish), Hungary, the Netherlands, New Zealand
Application- Australia, Belgium (French), England, Germany, Scotland

In Sweden and the United States, all scores were negative. The best performances in higher mental processes were reported for Germany, the Netherlands, and New Zealand.

Common clusters of achievement in science were also noted by Platt (1975) who identified similar patterns of performance in Commonwealth countries, Northern Europe, and the United States, Romance language countries, and developing nations. Bonora (1974) also identified science areas emphasized by individual countries. The Federal Republic of Germany favored biology. French students displayed

non-random equal performance in all areas. Biology scores were higher than chemistry in all countries, although the chemistry test may have been harder. Bonara also found that France emphasized practical work more than other countries, but not as much as teachers assumed. While performance on higher mental processes in France was higher than in other developed nations, teachers in France overestimated the amount of teaching of understanding scientific principles and underestimated the effect of transmission of factual information. Bloom (1974-1975) noted that students in nearly every country performed better on items requiring lower mental processes. He concluded that, despite the judgements of national experts, school programs emphasized factual information, not the higher mental processes requiring interpretation, comprehension, application, and inference.

Torney, Oppenheim, and Farnen (1975) reported rank orders of means for countries in Civic Education. The rank ordering of total cognitive scores indicated that New Zealand ranked first, followed in order by Germany, Sweden, Finland, the Netherlands, the United States, and Ireland. The lowest mean 16.9 was found in Ireland. On the 48 item test, discounting the score for Ireland, the means of the remaining six countries varied only seven points from 21.4 in the United States to 28.4 in New Zealand. Civic Education appeared under various titles in countries participating in the IEA project and was either a separate subject or a series of topics included in subjects such as history or geography. Almost all countries studied governmental organization, the nature of law, international affairs, national economic systems, functions of education, voting procedures, electoral and political party processes, individual freedom and social responsibility. Italy, Iran, and the United States emphasized national history, governmental structures, social conformity, and civil obedience. Sweden stressed social services and cooperation. Economics was stressed more in Finland than in other countries. England and Germany emphasized dissent toleration and conflict resolution. Topics common to all countries but with different emphases were comparative government, modern political theory, war and peace, and the use of inquiry and social science methods on solving social problems.

According to the results of cognitive testing in Civic Education, Germany performed lower than expected on international topics, Finnish students did better than expected on political institutions. Ireland was the lowest or the next to the lowest on all subscores. No more than 10% of students tested chose distractors on the subtests which indicated that the concepts were learned by most students. (Torney, Oppenheim, and Farnen, 1975). The variation in test scores was reflected in differences reported by teachers in the use of instructional materials and techniques. The patterns revealed an emphasis on the use of textbooks, questioning methods, and discussion. Notable exceptions were found in the use of individual material and individual conferences in the Netherlands, the use of lectures in Ireland, and the more even representation of techniques in the United States. Students reported little variation between countries on the encouragement of independent expression in the classroom. On a five point scale the highest ratings were found in New Zealand (4.1), Ireland (4.1), Germany (3.9), the Netherlands (3.8), Sweden (3.8), and the United States (3.8). The lowest rating was observed in Finland (3.4). (Torney, Oppenheim, and Farnen 1975).

In mathematics, subtest scores were generated for subject areas, topics studied, and mental processes used in the classroom. German students consistently scored higher than students from other countries although within Germany students scored three-fourths of a standard deviation higher on calculus than on algebra. Notable weaknesses were found for sets in Belgium and Finland and for analysis items in Belgium and England. Japanese students performed better than their counterparts in other countries in sets, analysis, and advanced arithmetic. In all other areas, German students gained the highest scores. (Husen 1967).

Although considerable variation existed in the specific topics included in subject areas, the average performance of students in the 95th percentile was similar and the subjects they studied were considered to be the same by curriculum experts in national research centers. International Schools could assume that students would have studied the same subjects and that the emphasis on particular topics would have been different for students from different countries. Schools need then to plan programs taking into account the various

educational backgrounds students bring to the schools as well as the student's intended further education. The study of subjects in any one school should be at least somewhat similar to the pattern previously followed by the student and representative of the program followed in the country in which the student plans to attend university.

Cautions in Interpreting Generalizations

The IEA studies reveal several generalizations significant for international education. Cautions for interpreting the data were presented by a number of authors. Comber and Keeves (1973) observed that some countries had not used objective testing prior to the IEA project. Unfamiliarity with the form and the low development of research methodology may have accounted for performance in some countries. They also noted that some nations evaluated their programs comprehensively for the first time in the IEA program. Developing countries scored more than one standard deviation below the average in developed countries in science, but the test was difficult in all countries since it was generalized across national borders. Two lines of best fit were found in science, one for the United States and Western Europe except Germany and the Netherlands, and one for the Commonwealth nations. Comber and Keeves attributed this to the nature of the content tested, the phrasing of items, and to the use of empirical approaches to science.

Smith (1975) criticized the lack of control groups composed of those not attending school and of subgroups within each type of home background. Incomplete information was collected on the effect of schools. He observed that IEA found home background to be more a determiner of achievement than schooling and argued that the conclusion should have been that variation in achievement appeared to be related more to the variation in home background than to variation in schooling. Smith's criticism, however, supports the observation that the upper 5% of achievers perform better and come from backgrounds more productive of skills needed for school achievement.

Plat (1975) observed that the IEA tests measured universal skills which each country affirmed but apparently did not represent uniformly in their curricula. The translation of test items from English also

favored the educational orientation of North America and Europe. The use of a multiple choice format was more familiar to students in Western countries. Platt believed the cross-sectional nature of the IEA tests resulted in empirical observations at a point in time as opposed to a longitudinal analysis so that surrogates for time were dependent variables which were hard to establish and interpret. The variation between predictors was too small to establish clear interpretations.

Coleman (1975) stated that the IEA studies used different procedures so that exact comparisons could not be made between studies, schools, or students. The data was not comparable and not recoverable from the published reports. He agreed with the IEA's assumptions of sequence for variables, but argued that the analyses were assymetric and it was impossible to compare the variance accounted for in different blocks. He concluded that Population IV was a non-random sample and that interpretation of the variance accounted for by school resources was not effective.

Comber and Keeves (1973) believed that the effects of schools and teaching were low because of the way data were collected and analyzed. More variance was explained by home background than by schools and their programs because more variance existed in homes than in schools. They observed that some of the total variance was explainable by the amount of variation which already existed within each variable. According to Comber and Keeves, that variance was lower for school and teacher characteristics. Lack of wide variation within the variables reduced the degree to which the relationships with criterion variables could be estimated.

Platt (1975) observed that the IEA used a sequential procedure of introducing blocks of predictors in a predetermined order for regression analysis. Only the increment in explained variance was assigned to each set of variables as it was entered in the sequence. Home background, for example, was assigned both its own contribution and the jointly explained variance of all other blocks. The effect was to prejudge the importance of non-school factors.

Comber and Keeves (1973) recognized that the regression analysis assumed a linear pattern of influence so that one variable effected

the next which followed in the analysis. They developed a school handicap score to allow comparability between schools and the communities from which they received students, assuming that the best indication of performance was what schools accomplished with the kind of students they received. The weights were calculated as the average regression weights when variables positively correlated with science achievement were regressed against Reading Comprehension, Word Knowledge, or science scores. The school handicap score was the average of regression weights calculated and rounded to integer values. Comber and Keeves believed the school handicap score produced stability and generalizability across criteria.

Hallak (1975), Maddison (1975) and Davis (1975) argued that non-formal education variables were inadequately explained. Variation in results between different subject subtests, incomparability of results, universality of the test content, the effect of question difficulty on rank ordering, accuracy of retentivity rates, the wide age range in Population IV, the effects of time, student-teacher ratios, financial support, and language of instruction could have been explained in a manner better suited for interpretation. Torney, Oppenheim, and Farnen (1975) mentioned that both the mathematics and results of regression analysis were insufficient to verify the validity of the chronological sequencing of variables. They also observed that problems existed in sampling, pressure to keep the tests short, lack of methods using open-ended questions, translation, and uncertainty about the commonality of subject matter content.

Thorndike (1975), author of the IEA report on Reading Comprehension, argued that the data were crude and possibly inaccurate. Pupils responded to questions in five categories in all countries, a procedure which did not allow for adequate differentiation between answers. Pupil input on variables reflecting parent characteristics was not checked for accuracy.

Postlethwaite (1975) observed too that the information on most variables was collected by questionnaires which may not have yielded accurate or complete details. He recognized that the low total variance explained was due to the poor development of educational theory in all countries but claimed that variables associated with differences in

student achievement were discovered despite problems in the regression analysis within countries.

Generalizations found in the IEA studies regarding blocks of variables are most effected by the criticisms related to regression procedures and assumptions of chronology. For the purpose of this paper, however, generalizations about specific variables were considered to be more significant. Information on the effects of non-school factors, amount of time, attitudes, and inclusion of subjects in the curriculum was derived in the IEA studies from self-reported data on questionnaires. As previously indicated, the reliability of that information was doubtful since its accuracy was not checked. The amounts of variance explained by these variables, however, was high and some confidence can reasonably be placed in the results. The equivalent performance of students in the 95th percentile and the effect of verbal skills were interpreted according to comparisons of test scores between countries and with Reading Comprehension. Generalizations one and three, then may be effected by errors of measurement, prior experience with objective test designs, and a possible orientation of test content toward Western cultures.

Conclusions

Six generalizations about student performance on an international basis can be drawn from the IEA studies of achievement:

1. Students at the 95th percentile are roughly equal in achievement in all subjects.
2. Non-school factors account for a significant amount of the variance in achievement.
3. A student's command of verbal skills determines much of what will be learned.
4. The amount of time spent studying a subject effects the student's performance in that subject.
5. Attitudes supportive of school and further education accompany successful achievement.
6. The subjects studied by students are equivalent in between-school comparisons although the relative emphasis placed on various parts of the content is different.

Common denominators effecting the achievement of students from various countries appear to be the student's verbal ability, the effect of home and community background, the amount of time spent studying a subject, and strong attitudes supportive of education. Students also seem to achieve at somewhat the same levels and have studied the same subjects.

Students who have moved from country to country may have high verbal ability, social background, and supportive attitudes. However, unless the programs of the International Schools serving such students are somewhat the same, consistency would not be found in the amount of time students spend on certain subjects or in the particular topics studied within those subjects. In order to prepare students for university entrance, an International School apparently needs to investigate the relationships between its programs and the programs of national systems as well as the programs of other International Schools.

Attempts to correlate programs in schools serving students abroad have been developed. The French system of education for French children abroad was established to reduce the gap between programs offered in France

and overseas. The European Baccalaureate was developed by the European Economic Community for students whose parents are employed by the Community. The United States Department of Defense schools and schools assisted by the Department of State Office of Overseas Schools form a network of educational programs in an American pattern. The International Baccalaureate was developed to provide a program for students desiring entrance to university systems throughout the world and is offered in over 125 schools.

With attention to common denominators of background and ability, International Schools should be capable of adequately preparing students for university entrance. Diagnoses of background and ability factors would seem essential for appropriate predictions of students' success. The generalizations available from the IEA studies complement attempts to understand the developmental stage of students residing outside of their home countries.

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